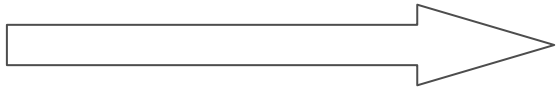
LUNEBURG LENS ANTENNA BASED ON METASURFING CONCEPT

University of Zagreb

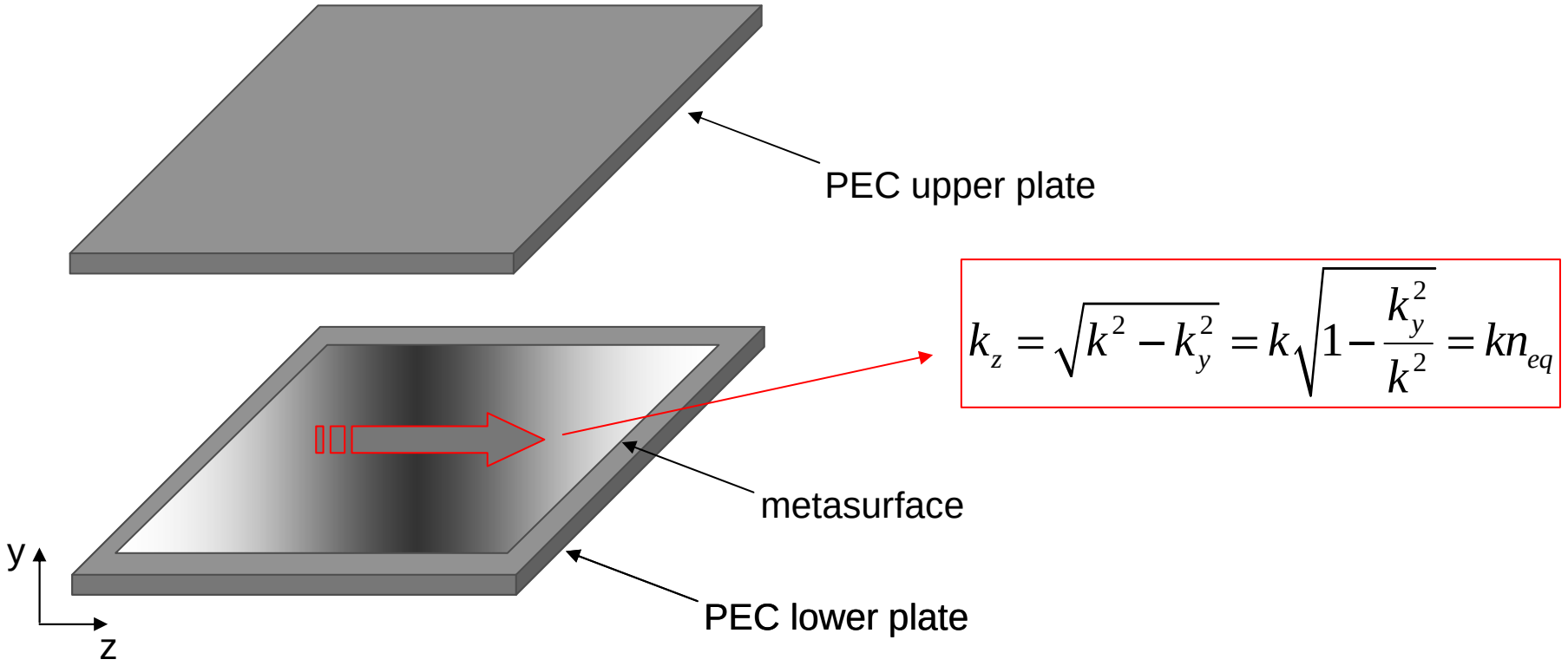


University of Siena

Marko Bosiljevac, Massimiliano Casaletti, Francesco Caminita, Stefano Maci, Zvonimir Sipus

Metasurfing within parallel plates

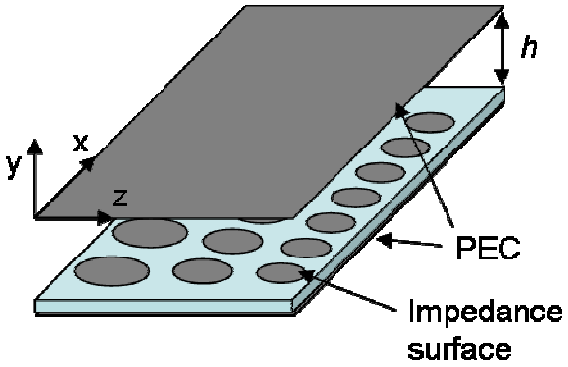
- Basic concept relies on the idea of changing the wave number in the propagation direction



$$k_z = \sqrt{k^2 - k_y^2} = k\sqrt{1 - \frac{k_y^2}{k^2}} = kn_{eq}$$

Circular patches as metasurface elements

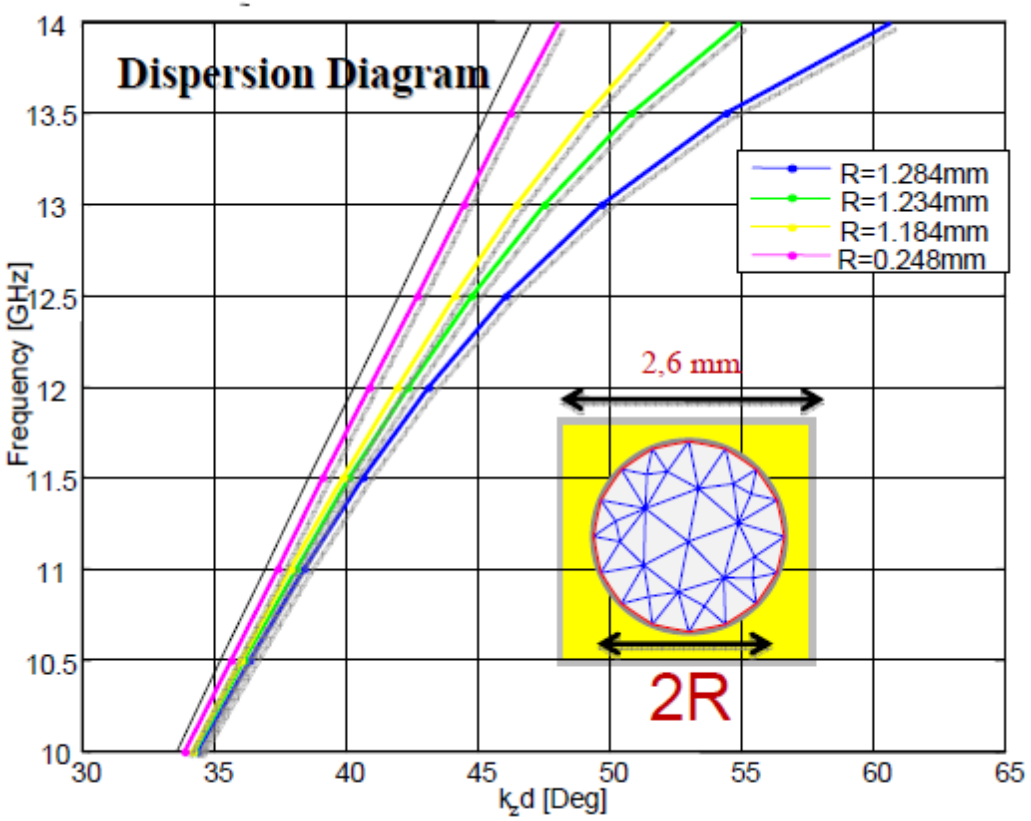
- In our considerations we will use a 2D periodic array of circular patches



Substrate parameters:

ε_r = 10.2

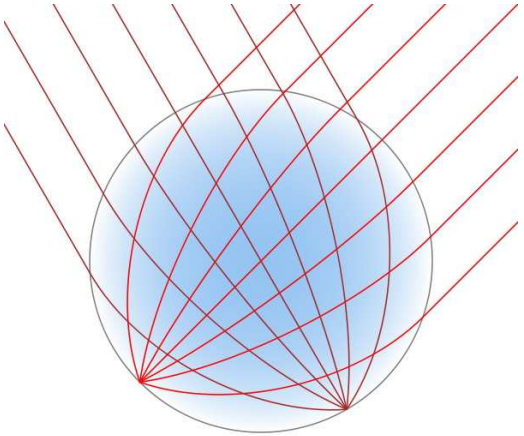
d = 0.7 mm

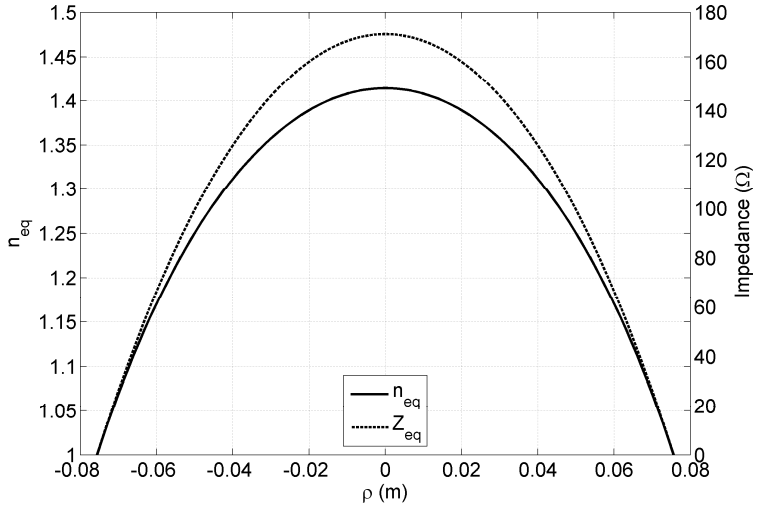


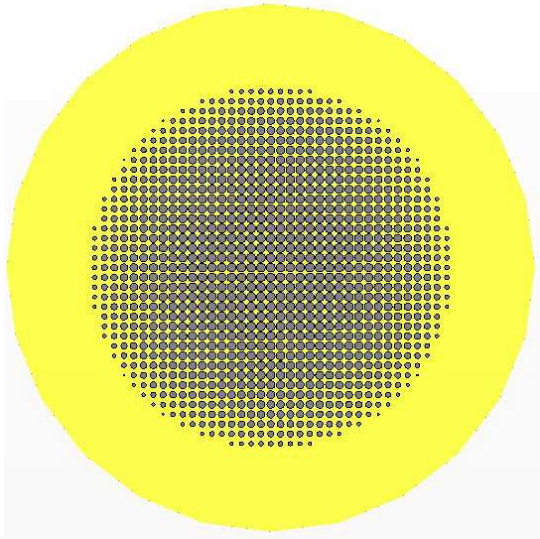
Luneburg lens realized using this concept

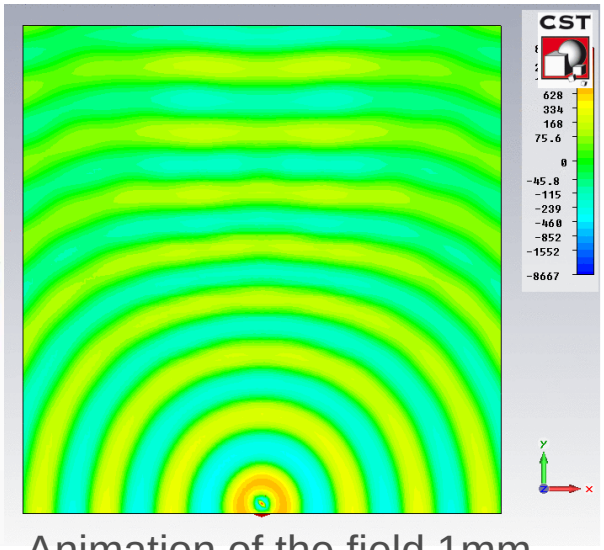
Luneburg law

$$n = \sqrt{2 - \left(\frac{\rho}{R}\right)^2}$$





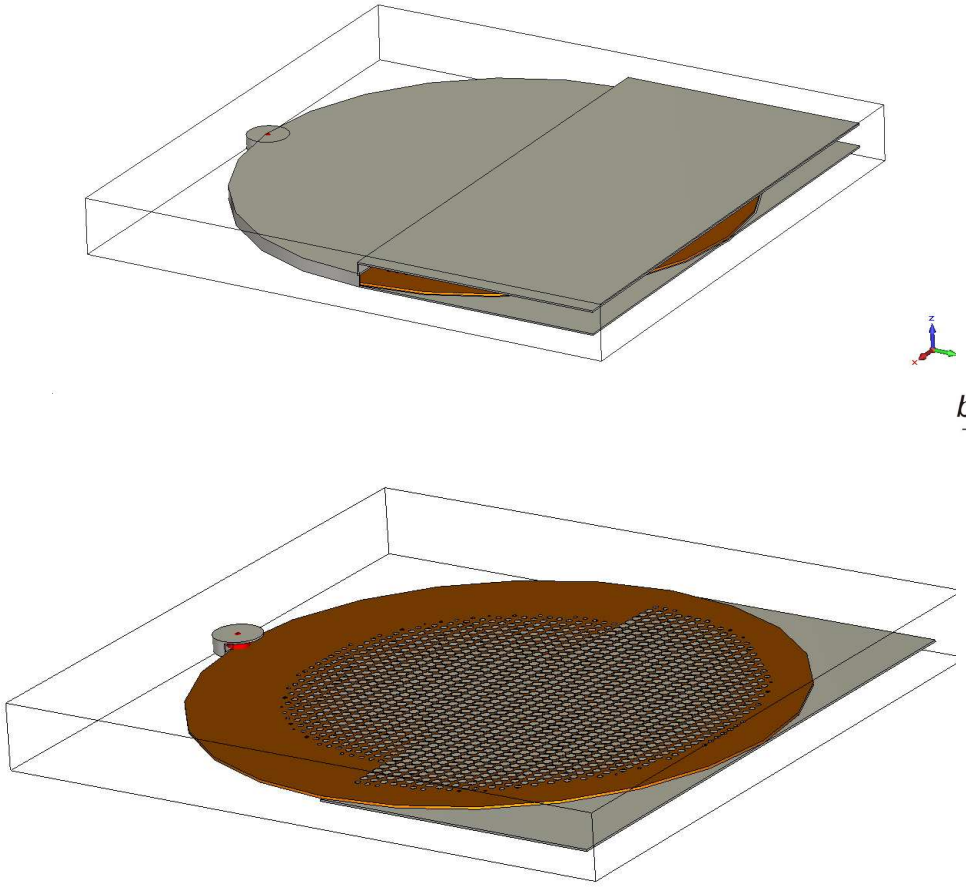




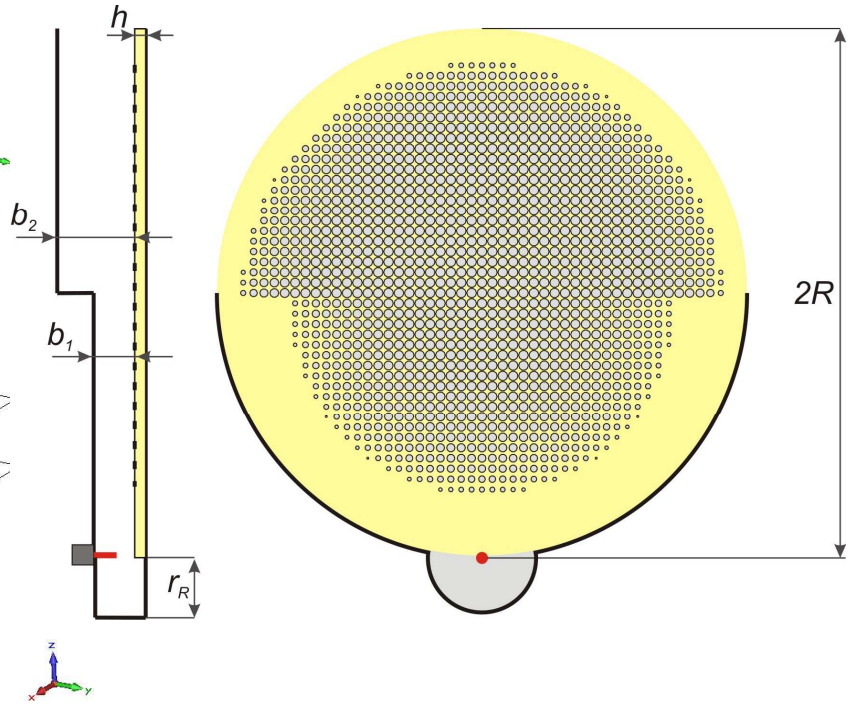
Animation of the field 1mm above the patches

Application – Metalens antenna

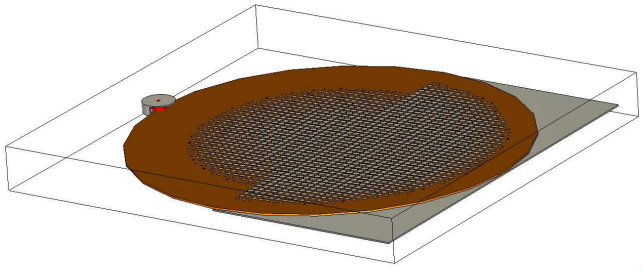
- Luneburg lens based antenna?



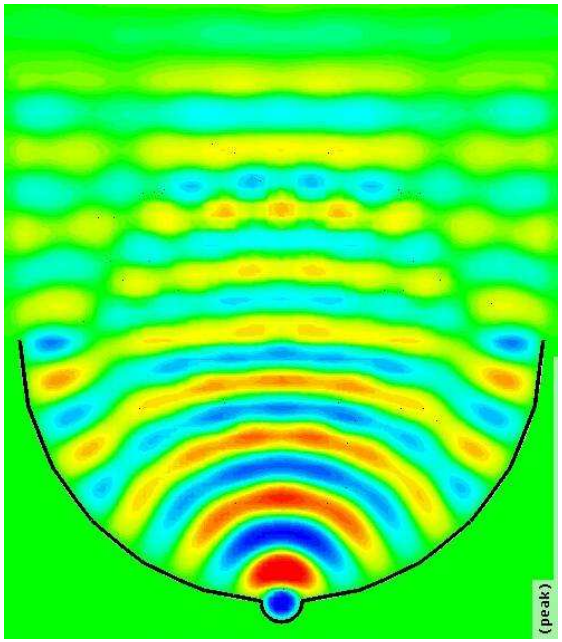
Entire lens excited by a small monopole with a backreflector

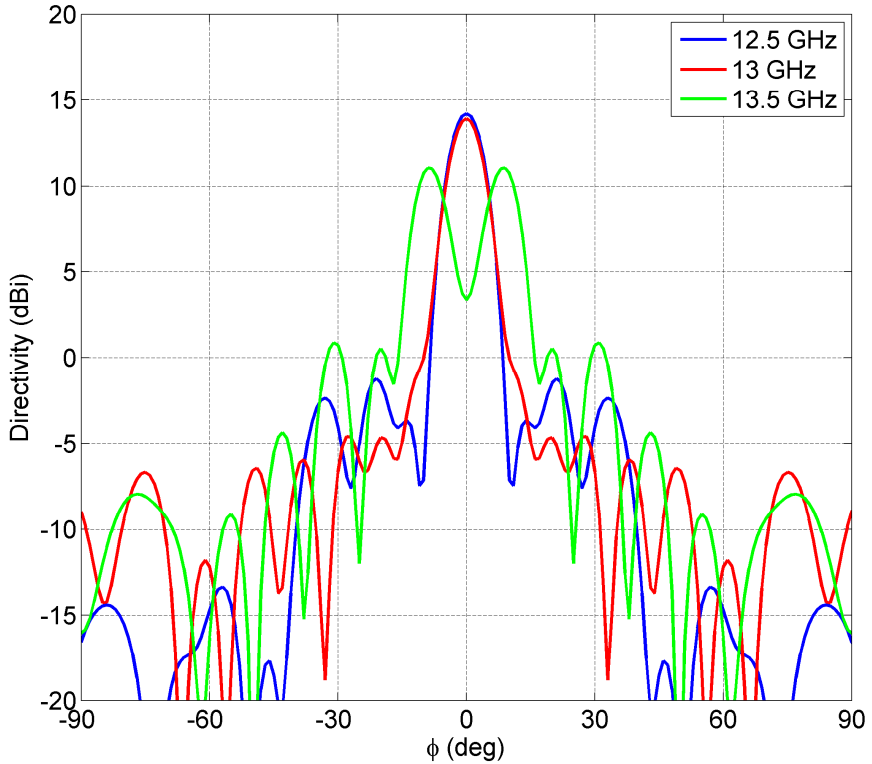


Application – Meta-lens antenna

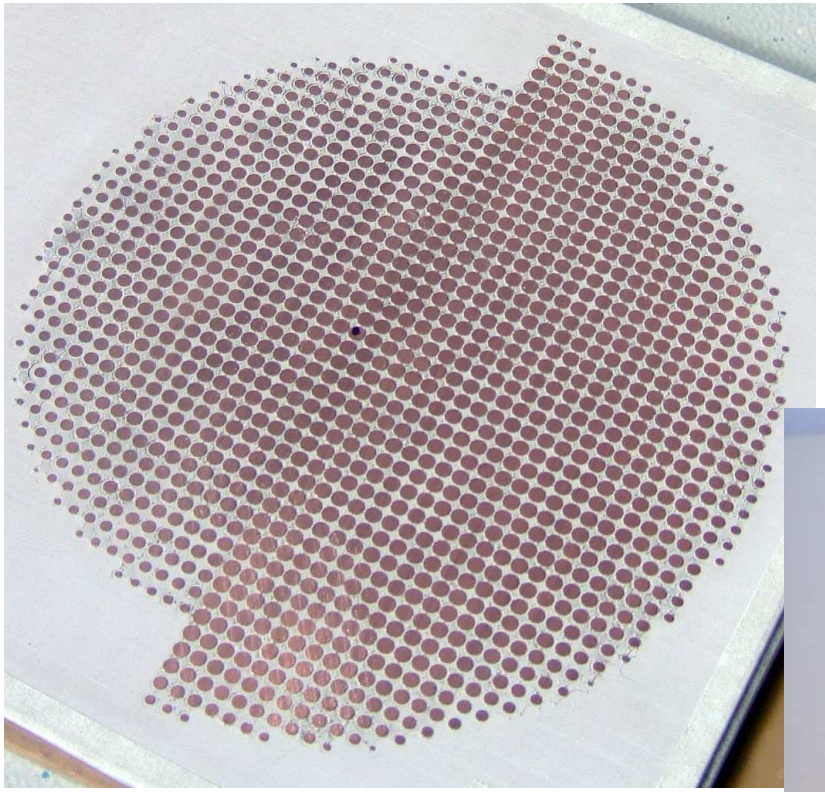


Dimensions:
R = 75.6 mm
h_1 = 2.3 mm
h_2 = 5.75 mm

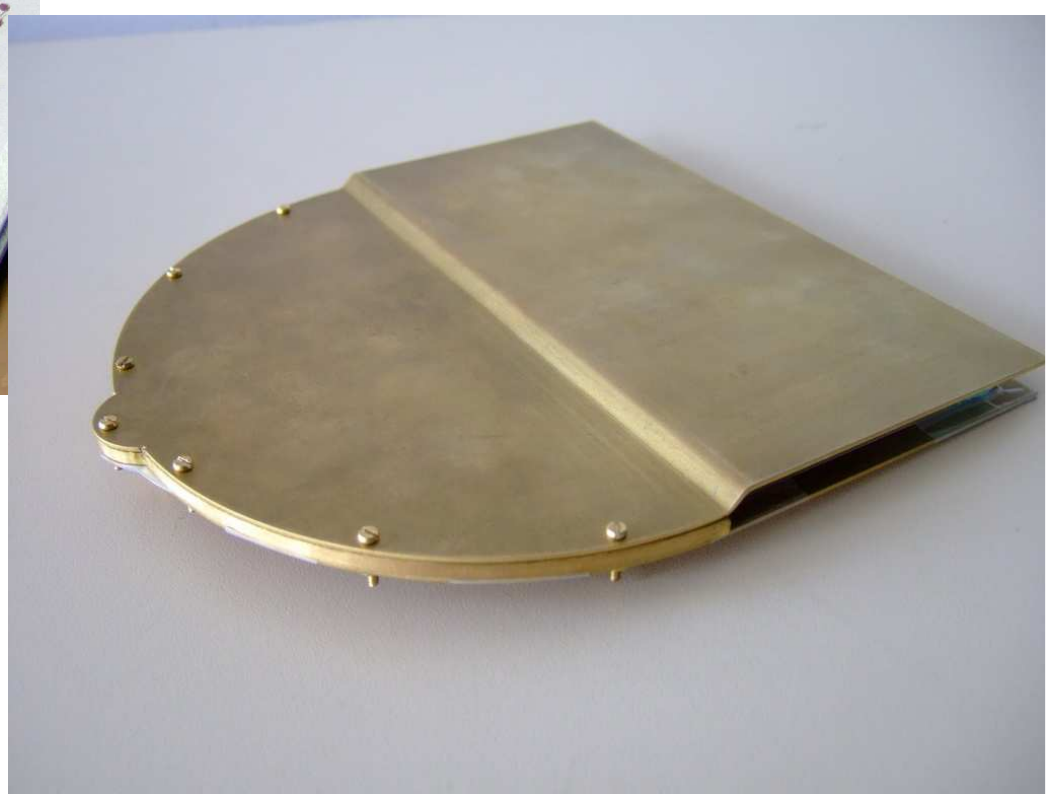




Built prototype



- Measurements are in progress...



Thank you for your attention!